Space Weather Forecast

Issued on Friday, 09 December 2022 at 13:07 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Increasing Chance of Moderate-class X-ray flares. Reducing Chance of Minor Geomagnetic Storms.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low over the past 24 hours, although there was a slight upturn in low-level common-class activity as a result of the rotating onto the southeastern solar horizon of a possible new sunspot group - not yet discernible given the narrow viewing angle. Amongst the largest of these small flares emanated at 08/2108UTC from the long-term largest sunspot in the southwest. This spot group showed decay in its intermediate spots overall, as well as areal decay and a tendency for its main leading penumbra to become more symmetric, all suggestive of a lowering flare risk from this group.

This was one of eight sunspot groups on the facing side of the Sun at present. Most of the rest of these groups were magnetically unipolar, or else small and simple dipoles, however there was a growing group near the middle of the Sun that saw proliferation of its intermediate spots. At the time of writing, this activity was not capped by notable flares.

A southeast 'filament' (arc of plasma) was seen to lift off in some extreme UV imagery and ground-based near-infrared between 09/0600-0900UTC. At the time of writing, the event has yet to materialise on confirming satellite imagery. Should this event have left the immediate solar environment it is possible that an Earth-directed component of any Coronal Mass Ejection (CME) may result. Other events visible were determined to be far-sided, with perhaps the most notable seen heading southeastwards into the UTC evening of 08 December, perhaps hinting at an arriving active region in this vicinity.

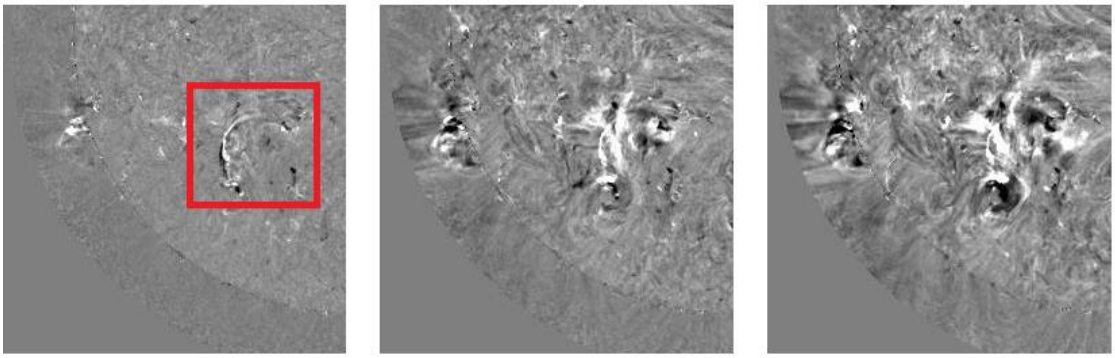

Figure 1: Crop of time-integrated extreme UV satellite imagery sequence between 09/0600 and 09/0900UTC, showing a 'filament eruption' boxed red. Any resulting CME is not yet visible on satellite images but is being monitored for. Image processing courtesy of SIDC ROB.

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No confirmed Earth-bound CMEs were observed in the period.

Solar Wind / Geomagnetic Activity: Solar winds were suggestive of ongoing connection to the fast wind, with an Elevated speed showing a slight downward trend. The number of particles in the solar wind was steady and near the long-term average, while their associated magnetic field soon returned to Background from Slightly Elevated levels.

The net result of the above solar wind measures was for initially quiet geomagnetic conditions that rose to a provisional peak just below Minor Storm G1 in the 00-03UTC interval, perhaps largely the result of a roughly three-hour anti-aligned spell of the solar wind magnetic field with Earth's field.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity carries a daily chance of isolated Moderate-class flares. The outlook for flare risk is a worsening one, in part because of possible arriving sunspots on the southeastern solar horizon, with this party of the Sun perhaps also responsible for a recent non-Earth-directed CME.

Solar Wind / Geomagnetic Activity: No Earth-directed CMEs currently feature in the forecast.

The only fast wind in the forecast is the incumbent high speed stream. Because the solar wind magnetic field is now reducing, the peak risk of Minor Geomagnetic Storm G1 is now thought to have passed from this feature, perhaps surviving as a vestigial slight chance on Saturday, before decaying later in the UTC weekend to leave more reliably quiet conditions.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, but there remains a daily slight chance of seeing S1+ levels if any significant flares were to occur.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	5	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	30	30	40	40
Very Active	R3 to R5 X	No	5	5	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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